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NOTES ON CLIMATOLOGY.

BY

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RAINFALL, COMMERCE, AND POLITICS.—There are all too few studies of the human or economic relations of meteorology and climatology, and for this reason a recent paper by Mr. H. H. Clayton, of Blue Hill Observatory, Hyde Park, Mass., is likely to attract considerable attention. The subject, *The Influence of Rain-fall on Commerce and Politics* (Popular Science Monthly, December, 1901), is one which naturally excites the interest of even the casual reader, who often goes no further than the title of a book or of a magazine article, and any one who considers carefully what Mr. Clayton has to say will agree with the author as to the need of more instruction in meteorology in the universities of our country.

After a study of the annual rainfalls and water-levels in the United States from 1830 to 1896, it appears that every severe financial panic has been associated with a protracted period of deficient rainfall, and that there has been only one period of protracted drought without a severe financial panic, and that was the drought whose effects were masked by the larger disturbances attending our Civil War. A severe financial panic in 1837 came in the midst of a drought. Another period of drought culminated in 1855 in the Mississippi valley, and in 1856 in the Ohio valley. The panic of 1857 followed. Another severe drought reached a maximum in the Ohio and Mississippi valleys in 1871, and in the Lake Region in 1872. The panic of 1873 followed. The last drought, which reached its maximum severity in 1895, was associated with the panic of 1893 to 1894, the business depression continuing throughout the interval, 1893 to 1897 inclusive.

It is well known that changes in political parties are closely related to the conditions of prosperity or of depression which prevail at the time. Mr. Clayton points out that a change from a Republican majority of 107 in the House of Representatives to a Democratic majority of 74 was brought about at the first national election after the financial panic of 1874. Political effects following the crisis of 1893 are of so recent a date that they need no comment. Mr. Clayton's paper is certainly extremely suggestive, and we agree entirely with the author when he says:

To designate as a superstition the belief in the capacity of the various political

parties in power to make prosperity may be extreme, but certainly careful thinkers will join in the wish that such relations to natural phenomena as are here outlined might be carefully studied by trained investigators, using well-known scientific methods.

THE HEALTH OF THE NAVY IN 1900. — The Report of the Surgeon-General of the Navy for 1901 contains some matters of interest in connection with tropical hygiene, and also with regard to the experience of our men when ashore in China during the recent war. The number of cases of typhoid fever (175) was greater than that of the previous year (134), the difference being explained partly by the fact that the disease is very prevalent in the Tropics, and partly on the ground that there was an increase in the enlisted force. The disease was especially prevalent at Guam. Twenty-eight cases occurred there out of a total of 83 cases returned during the year from all shore stations.

Dysentery caused a larger number of admissions than in 1899, 40 cases occurring in Guam, 34 among the force ashore in China, and 33 in Cavite.

Dengue was especially prevalent at Cavite, P. I., nearly all persons on duty there being attacked shortly after their arrival. The attacks were generally mild in type, ending in complete recovery, and usually in immunity from the disease.

Surgeon George A. Lung, medical officer with the first regiment of marines in the Peking relief expedition, gives an interesting account of that expedition. The heat caused great suffering; the thermometer ranged above 100°. Dust, insufficient or bad water, and excessive fatigue also added to the difficulties encountered on the march. Dr. Lung says:

Nearly everyone lost flesh on the march. In a few cases this was the only symptom that indicated by its pronounced character that the individual was suffering from some form of infection. In connection with the marked emaciation there was a peculiar tendency of the patient to cry. When he applied for treatment, and was asked to describe his symptoms, his lips trembled and tears ran down his face, conscious all the time he was acting ridiculously, but unable to control his emotions. It reminded one of descriptions of the so-called booboo fever said to occur in the Hawaiian Islands.

ANNUAL REPORT OF THE CHIEF OF THE WEATHER BUREAU. — The Annual Report of the Chief of the Weather Bureau is a publication which always deserves attention, for there is no Department of our Government whose work is more closely connected with the occupations of our people. The last Report for the fiscal year ending June 30, 1901, naturally contains many items which have

already been made known through the medium of the newspapers, but which, nevertheless, deserve to be recalled. During the year a very important extension of the forecast work of the Weather Bureau was undertaken. This consisted in an arrangement with the Meteorological Office in London whereby daily weather reports are now cabled to Washington from that city giving the conditions at certain points in the British Isles and on the continent of Europe, and also from Ponta Delgada, in the Azores. These reports, together with observations made at Nassau, Bermuda, and Turk's Island, are now published regularly on the daily weather maps issued at Washington, Baltimore, Philadelphia, New York, and Boston, together with forecasts of the force and direction of the wind and the state of the weather for the first three days out, in the case of steamers bound east from American ports. In some cases, when severe cyclones were passing to the eastward off the American coast, forecasts of the weather which would probably be met by steamers leaving European ports westward bound were cabled to London. Predictions of fog were also issued when conditions favourable for fog development were indicated on the steamship routes west of the 50th meridian.

The principal storm of the year was the Galveston hurricane of Sept. 8, 1900. Upwards of 6,000 human lives were lost in it, and property to the estimated value of \$30,000,000 was destroyed. In order to increase the accuracy of the daily weather forecasts the Chief of the Weather Bureau has announced that

marked success in forecasting, the invention of new methods of forecasting, or the discovery of new facts or principles of marked value to the forecaster, will have a special weight in considering the merits of employes of whatever grade for promotion.

The cotton region service has been extended into Oklahoma and the Indian Territory; and arrangements have been made with reference to inaugurating a fruit and wheat service in California, to be carried on along similar lines. Nearly 42,000 families in farming districts are now supplied with the latest weather forecasts by means of the rural free mail delivery. Local snow bulletins, issued by the State centres in the Rocky Mountain region, are meeting an important need. Information as to the depth and character of the snowfall in the mountains is contained in these bulletins, and these data are valuable in connection with the summer water supply for purposes of irrigation. Professor F. H. Bigelow has practically completed a revision of the barometric system of the United States, Canada, and the West Indies. Sixty new storm-warning towers have been erected during the year, equipped with improved lan-

terns. Much has been done by the officials of the Weather Bureau to promote the study of meteorology in the schools.

CLIMATIC CONDITIONS ALONG THE PANAMA CANAL.—One of the latest contributions to the canal discussion is that of General Henry L. Abbot on *The Present Condition of the Panama Canal* in the Engineering Magazine for January, 1902. Especial emphasis is laid on the climatic conditions along the route of the proposed Panama Canal. The temperature throughout the entire region where an Isthmian canal could be built varies but little during the year from an annual mean of 79°. That the white race cannot do hard manual labour under these conditions of uniform moisture and high temperature is perfectly clear; but the West Indian negroes do not suffer. Therefore here, as elsewhere under similar circumstances, the whites must be the overseers and the blacks must do the work. The first excavations in the virgin soil have been followed by many cases of malarial fever, but experience has shown that when the deeper subsoil is reached there is much less difficulty on this score. The Panama Company's hospital records during the past twenty years demonstrate the fact that there is no reason for apprehending serious trouble from sickness in the future. The question of rainfall is naturally of the greatest importance. On the Gulf coast, at Colon, the mean annual rainfall is about 129 inches; in the interior, about 94 inches; and on the Pacific coast, about 57 inches. Everywhere there is a well-defined dry season of about four months, and this period can be made use of for carrying out any specially difficult engineering works. The heaviest work that is to be done is in the interior, where the precipitation is the smallest.

In Nicaragua, *per contra*, the annual rainfall on the Gulf coast, where the heaviest excavating must be done, is about 250 inches, and there is no dry season. In the interior and on the Pacific coast there is much less rain, and there is a dry season. The rainfall even here, however, seems to be greater than that in the corresponding portions of the Panama district.